$$H_{123} = \begin{bmatrix} 2\,h - 6\,\mu + U & -\left(\sqrt{2}\,t\right) & 2\,t & 0 \\ -\left(\sqrt{2}\,t\right) & 2\,h - 6\,\mu + U & 0 & -t \\ 2\,t & 0 & 2\,h - 6\,\mu + 2\,U & \sqrt{2}\,t \\ 0 & -t & \sqrt{2}\,t & 2\,h - 6\,\mu + 2\,U \end{bmatrix}$$